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GASOLINE COMPOSITION

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1 Claim. (Cl. 44—66)

This invention relates to gasoline fuel compositions for use in internal combustion engines and is particularly concerned with new gasoline compositions adapted to provide improved engine operation under cool and humid weather conditions.

A well known difficulty encountered in the operation of automobile engines in cool and humid weather is that of frequent engine stalling during the warm-up period. The trouble is most prevalent in northern climates during the fall and winter periods. Its cause has been traced to the formation of ice in the carburetor of the engine. Although the difficulty has existed for a long time, it has become more prevalent than ever in recent years due to the use of more highly-volatile, winter-grade gasolines. Thus, the evaporation of gasoline in the carburetor produces a considerable cooling effect which is more pronounced with the higher volatility gasolines. In cool, moist weather, this cooling effect is sufficient to cause condensation and freezing of the moisture present in the air entering the carburetor. Consequently, in the period before the engine becomes warm, ice is formed which restricts the air-intake openings and causes the engine to stall. It has been found that conditions particularly conducive to stalling difficulties due to ice formation in the carburetor are ambient temperatures of from about 30° F. to about 65° F., when the relative humidity is above about 65%. The stalling occurs most readily when the engine is idling and although the frequency of stalling is greater with gasolines of higher volatility, such as those provided for winter use in northern climates, the difficulty is experienced with all types of commercial gasolines in all types of cars.

It is the object of this invention to provide gasoline compositions having anti-icing properties such that substantially stall-free operation, under conditions which would normally induce stalling difficulties, is attained. Other and further objects of the invention will appear from the following detailed description thereof.

In accordance with the present invention, it has now been found that stalling difficulties due to the formation of ice in the carburetor of an engine can largely be overcome by incorporating in the gasoline a small amount of glyceryl monooleate.

As is well known to those familiar with the art, a gasoline is a mixture of hydrocarbons having an initial boiling point varying between about 75° F. and about 135° F. and an end-point varying between about 250° F. and about 450° F. and boiling substantially continuously therebetween.

Glyceryl monooleate provides excellent anti-icing properties in all types of gasolines. The gasoline may be comprise of straight-run or cracked petroleum distillates boiling in the gasoline range which have been derived from either paraffinic, naphthenic, mixed base or other crude petroleums. Also, it may comprise products prepared by special processes, such as polymerization, alkylation, hydrogenation, etc. Mixed distillate and/or processed stocks, including stocks which have been subjected

to various refining treatments, such as acid extraction, solvent treating, etc., are all improved with respect to their anti-icing character by treatment with glyceryl monooleate.

Carburetor icing tests

The ability of glyceryl monooleate to prevent engine stalling, under conditions conducive to carburetor icing has been demonstrated by means of a series of cold-starting tests. A base gasoline consisting of 100% straight-run component and having the following properties was utilized in the tests.

Boiling point:

Initial	°F	126
10%	°F	154
50%	°F	182
90%	°F	222
End	°F	278
Reid vapor pressure		5.8
Gravity, °API		66.7

This gasoline was selected on the basis of its high volatility which made it particularly susceptible to stalling under cool, humid operating conditions.

The test procedure was as follows: A standard Chevrolet engine was installed in a "cold" room equipped with temperature and humidity controls. With the room temperature maintained at approximately 44° F. and the relative humidity at approximately 97%, the engine was started and operated for one minute at 2000 R. P. M., with no load. At the end of the one minute operation, the engine speed was reduced to 500 R. P. M. and the time required for the engine to stall was noted. It had been determined previously that under these particular conditions of temperature and humidity, and using the aforedescribed base gasoline, the engine would stall immediately when the speed was cutback after the one minute operation period. A series of tests were conducted employing the base gasoline containing various concentrations of the glyceryl monooleate of this invention and other glyceryl esters of fatty acids in order to determine the amount of the ester required to provide a practicable delay in the stalling time and to show the unexpected superiority of the glyceryl monooleate in this respect. The results of these tests were as follows:

Ester Added	Concentration, Percent by Weight	Stalling Time, Secs.
None		0
Glyceryl Monooleate	0.003	3
	0.004	17
	0.006	23
	0.008	24
Glyceryl Dioleate	0.03	11
	0.06	33
Glyceryl Monolaurate	0.05	28
	0.12	28
Diethylene Glycol Monolaurate	0.03	5
	0.06	8
	0.12	16

It will be observed that the glyceryl monooleate was outstandingly effective in terms of the amount required.

It will be appreciated that many commercially available gasolines, including those of the so-called winter grade type, are less volatile than the gasoline used in the aforesaid tests and are, therefore, less susceptible to stalling under stall-inducing weather conditions than the test gasoline. Nevertheless, such gasolines are prone to produce stalling and they are benefited with respect to their stalling tendencies by the use of glyceryl monooleate. As a rule, somewhat smaller amounts of the additive may be used with gasolines of relatively low volatility, while somewhat larger amounts may be required for higher

volatility gasolines. Broadly, the amount of the additive contemplated for use ranges from about 0.003 weight percent up to 0.009 weight percent, the particular amount depending upon the particular gasoline to which it is added. The use of from about 0.006 to 0.009 weight percent, however, is generally preferred.

The glyceryl monooleate can be used in gasolines containing other additives designed to improve the gasoline in various other respects. Thus, it will improve the anti-icing character of gasolines containing metallo-organic anti-knock agents, such as tetraethyl lead. The tetraethyl lead is ordinarily present in amounts of from about 1 to about 5 ccs. per gallon. As is well known, these gasolines ordinarily contain an organic halide lead-scavenger, such as ethylene dichloride, ethylene dibromide or the like.

The gasolines can also include an anti-oxidant of the polyalkylated phenol type, such as, for example, 2,6-ditertiary butyl para-cresol; 2,4,6-tributyl phenol, 2,4-dimethyl, 6-secondary butyl phenol, or the like. Suitable amounts of such an anti-oxidant vary from about 0.0004 to about 0.001 weight percent.

The invention also contemplates the use in leaded gasolines of an additive capable of inhibiting preignition, particularly in gasolines designed for use in high compression engines. Esters of phosphorus acids, for example triphenyl phosphate, tricresyl phosphate, trimethyl phosphate, diphenyl cresyl phosphate and trimethyl phosphite, are contemplated for this purpose. Phosphorus acid esters containing halogen and sulfur constituents, such as, for example, tri-beta-chloro propyl thionophosphate, are also suitable. Such additives are used in amounts of from about 0.01 to about 0.03 weight percent.

The gasolines can further contain additives that deactivate metals, such as copper, etc., which catalyze oxidation of the gasoline. Metal deactivators of the Schiff base-type are particularly contemplated. These compounds are produced by the condensation of one mol of a polyamine having two primary amine groups with two mols of an aromatic orthohydroxy-substituted aromatic aldehyde. A particularly effective compound is N,N'-disalicylal 1,2-propylene diamine. From about 0.00004 to about 0.0004 weight percent of the metal deactivator is ordinarily used.

Illustrative of specific gasoline compositions contemplated by the present invention are the following:

(A) A premium gasoline for use in high-compression engines was prepared as follows: To a gasoline comprised, on a volume basis, of approximately 40% thermal, 30% catalytically cracked and 30% straight run components, the following were added:

(*a*) 0.009 weight percent glyceryl monooleate
(*b*) 0.02 weight percent diphenyl cresyl phosphate
(*c*) 0.004 weight percent 2,6-ditertiary butyl para cresol
(*d*) 0.0002 weight percent disalicylal, 1,2-propylene diamine
(*e*) 2.5 cc. T. E. L. per gallon

(B) Same as (A) except that (*b*) was 0.02 weight percent tribeta-chloropropyl thionophosphate.

Although the invention has been illustrated by means of specific materials and tests, it is not intended that the scope of the invention be limited thereby, but only as indicated in the appended claim.

What is claimed is:

A gasoline of improved anti-icing characteristics having incorporated therein as the sole anti-icing agent from 0.003% to 0.009%, by weight, of glyceryl monooleate.

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